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AUTHOR Parsons, Sharon
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ABSTRACT

This paper examines the establishment of a collaborative science education learning community over a five-year period. By assuming a pluralistic theoretical perspective which has been influenced by post-critical theory, postmodernism/poststructuralism, and feminism, focus is placed on the challenges experienced in developing a learning community among student teachers, classroom teachers, and university faculty. A consideration of the role that "scared stories" have in maintaining the established power and knowledge relationships and in maintaining the master narratives in higher education is included. (Contains 26 references.) (Author/DDR)

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A SCIENCE EDUCATION LEARNING COMMUNITY STORY

Paper Presented By

Sharon Parsons
College of Education
San Jose State University
One Washington Square
San José, California 95192-0074
Email: S100EWOK@AOL.COM

S. Parsons

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Abstract

This paper examines the establishment of a collaborative science education learning community over a five-year period. By assuming a pluralistic theoretical perspective which has been influenced by post-critical theory, postmodernism/poststructuralism and feminisms I have been involved in an examination of the challenges in developing a learning community among student teachers, classroom teachers and university faculty. While there have been many research outcomes one research outcome that will not go away is the recognition of the need to deal with the "scared stories" of university practice. My research focus therefore has shifted to examining the "scared stories" which contribute to maintaining the established power/knowledge relationships, and maintaining the master narratives in teacher education.

A Science Education Learning Community Story

This past five years (1993-1998) I have been involved in an on-going action research project where I have been attempting to facilitate the development of a science education learning community. The overall goal was to build a community of learners where university faculty and teachers would become co-learners in the process (Bollough, & Gitlin, 1995; Greenleaf, 1995). In building the community we would only working towards the improvement of science education practice, but the construction of a science education learning community where teachers were empowered to become full participants in the process.

I recognized that whenever there is a discussion of empowerment in research there is also a need to deal with the fact that the issue of empowerment is problematic (Gore, 1992). My major concern about the politics of empowerment stems from the agent of empowerment. Given that the agent is usually the teacher (or in this case a science educator), and that the subject (or object) of empowerment is "Others" (preservice/inservice teachers), a distinction is implied between us and them. Therefore, there is danger apparent in the work of academics (such as myself) whose discourse is purportedly empowering for the teachers (and others). In focusing on "Others" there is a danger of forgetting to examine one's own (or one's group's) implication in the conditions one seeks to affect (Ellsworth, 1992). Therefore, my research focus has been on examining the success (of this academic) at achieving the goal (the construction of a science education learning community) rather than a critique of "Others".

Connelly and Clandinin (1992) note that seldom do university educators recognize that their own professional knowledge is embedded in, and also under study when they engage in research on schools. Hence, rarely do we acknowledge the autobiographical connection, but proceed, as if we have a "god's eye view". Moreover, when we work with teachers we mirror

ideologies embedded in the teaching of the "uncritically reflective" teacher. Hence the need to examine the "sacred stories" in teacher education. Hollingsworth (1994) proposed that we challenge this scared rite in teacher education from a feminist perspective.

Making Sense of the Process of Establishing the Learning Community

An action research agenda was assumed to establish a science education learning community. *Action research* in its classical sense, is a term used to describe a family of activities in curriculum development, professional development, school improvement programs, and systems planning and policy development (Kemmis, 1982). What these activities have in common is the identification of strategies of planned action which are implemented, and then systematically submitted to observation, reflection and change. Also, the participants in any given action are integrally involved in all of these activities. Lewin probably best summarized action research when he described it as consisting of analysis, fact finding, conceptualization, planning, execution, more fact-finding or evaluation, and then a repetition of this whole cycle of activities — indeed a spiral of such circles (Kemmis, 1982).

Action research has continued to evolve as evidenced in the work of Hopkins (1985) and others (Davis, 1996; Hollingsworth, 1994, 1996; Loughran & Northfield, 1996) to include teacher research on classroom practice. Typically teacher research has come to mean research done by teachers on their practice. If a preservice educator , or university faculty member is involved they have typically played the role of facilitator for the process, or teacher of a course on teacher research. Even in such cases most university faculty member do not engage in research on their own practice. One exception is Loughran & Northfield (1996) where Northfield critically examines his role as a preservice educator, by returning to teach math and science half-time at a junior high school. In institutions such as mine where the primary focus is teacher preparation and not research, the logical focus for my research should be on my own practice through teacher research.

My teacher research has been influenced by the combining of a feminist praxis and action research the basis of which is developed in the work of Hollingsworth (1994, 1996). Hollingsworth (1994) in her longitudinal action research with beginning teachers introduces the concept of "collaborative conversations" as a way of making sense of, and improving practice. Similarly my teacher research has evolved to examine the longitudinal cycle of collaborative activities that has been continually examined to provide new directions for the establishment of a science education learning community. While initially I was attempting to become critical of the university's role through the process of action research, my work has now evolved to where I am now focusing on the utilizing feminisms (Nicholson, 1990) as a theoretical basis for examination of my practice.

While critical theory (Carr & Kemmis, 1986) was initially useful to me in pointing out the underlying struggles I now, like many feminists (Luke & Gore, 1992) have come to view critical theory to be insufficient to differentially explain experiences. I am now informed by more recent feminist literature which has come to view critical and earlier feminist theory as adding to the pertuation of their own master narratives. This position can be described as "post-critical" which is the resistance to claims to view the world from a unified stance. While this can viewed by some as a paralyzing act for me it is an acknowledgment of the usefulness of multiple frames of reference. The focus of the my analysis in this paper however will be on an examination of the 'sacred stories' associated with only one frame of reference, the university's role in building the learning community.

Since I am the part that is university connected in this sense this action research project has also been informed by my on-going autobiographical analysis of my practice (Parsons & Matson,1995; Parsons, Matson & Rohan, 1995). Davis (1996) is one of the few science educators who makes the connection in her work between action research and autobiography. Because I am intimately involved in building the learning community the focus is also autobiographical. I will acknowledge that I am only sharing one side of the story. There are other aspects of the story which need to be shared and that is preservice and inservice teachers side of the story. We need to get to the point where teachers are able to share; have equal voice in the interpretation. My writing their stories will not do that.

Emerging Patterns in the Science Education Learning Community Story

Before reporting briefly on the research outcomes it is important to list the action research cycles[1] which have been used as a basis of analysis:

Cycle I (Spring '93-Fall '94)	Initiating Collaborative Relationship[2]
Cycle II (Fall '94-Spring '95)	Establishing Collaborative Relationship & Community of Co-Learners
Cycle III (Fall '95-Spring '96)	The Search for Routes to a Common Ground for the Building of a Community of Co-Learners
Cycle IV (Fall '96-Spring '97)	The Continued Search for Routes to a Common Ground: Dealing with the Sacred Stories
Cycle V (Fall '97-Spring '98)	The Beginnings of Critical Institutional

[1] Cycle in this case means the block of time that was used to complete an action research reporting period.

[2] Titles given to the cycles describe the primary outcome during that period.

Reflection

For the analysis of cycles 1-2 the following conceptual categories were used to evaluate the action research outcomes:

1. Technical Action Research/Prediction
   Participants Roles - Facilitators have cooped practitioners into working on externally-formulated questions which are not based in their practical concerns.
   Focus of Research - It employs techniques to create and sustain the investigation of issues raised by outsiders, and it frequently concerns itself almost solely with the efficiency and effectiveness of practices in generating known outcomes.
   Type of Outcomes - It may lead to the improvement in practices from the viewpoint of the outsider, and frequently concerns itself almost solely with the efficiency and effectiveness of practices in generating known outcomes.

2. Practical Action Research/Understanding
   Participants Roles - Facilitators form cooperative relationships, helping them to articulate their own concerns, plan strategic action for change, monitor the problems and effects of changes actually achieved. Participants monitor their own educational practices with the aim of developing their practical judgment as individuals.
   Focus of Research - The facilitator's role is Socratic: to provide a sounding-board against which practitioners may try out ideas and learn more about the reasons for their actions, as well as learning more about the process of self-reflection.
   Type of Outcomes - Practical action research may be a stepping-stone to emancipatory action research in which participants themselves take responsibility for the Socratic role of assisting the group in its collaborative self-reflection.

3. Emancipatory Action Research/Emancipation
   Participants Roles - The practitioner group takes joint responsibility for the development of practice, understandings and situations, and sees these as socially-constructed in the interactive processes of educational life.
   Focus of Research - All groups assume equal status in the process
   Type of Outcomes - The critical impulse of research is towards the transformation of educational institutions is expressed not only in individual thinking but in the common critical enterprise of changing selves in order to change the institutions those selves generate through their joint practices of communication, decision-making, work and social action.

For cycles 3-5, borrowing from Lather's (1991) work I have added a fourth category which my interpretation of what a deconstructivist action research agenda would look like:

4. Deconstructivist Action Research/Deconstruct

Participants Roles - There is a recognition of what is needed for the practitioner group to take joint responsibility for the development of practice, understandings and situations, and sees these as socially-constructed in the interactive processes of educational life. This is recognition that there are multiple perspectives on this process.

Focus of Research - There is a recognition of what is needed for all groups to assume equal status in the process.

Type of Outcomes - The critical impulse of research is towards not only the transformation of educational institutions of "others" but "one's own". The recognition that it is not enough to focus on the common critical enterprise of changing selves in order to change the institutions.

The analysis of the activities for cycles 1, and 2 reflect the organization provided by the first three categories. The focus in cycles one and two was on movement towards an emancipatory agenda. I have described this as Part 1 of the story, *early analysis of sacred stories*. In cycle three the focus started to shift towards examining activities from a deconstructive perspective and this is reflected in cycles 3 -5. This is what I have described as Part 2 of the story, *recent analysis of sacred stories*.

Part 1: Early Analysis of Sacred Stories

Cycle I (Spring '93-Fall '94): Initiating a Collaborative Relationship. The first cycle of the project focused on initiating a collaborative relationship. The focus, in the first year, was on teacher preparation, and as such it did little to create anything close to an emancipatory action research climate for the inservice teacher practitioners. It was evident that it would take extended time to establish an emancipatory action research climate at the classroom level. It required a shift, from teachers aiding in the establishment of the science emphasis program (technical-practical) -- to the teachers shaping how such a program might develop (emancipatory). In addition, the activity must move from being theory driven to theory generating in its orientation. This required greater participation by teachers.

Cycle II (Fall '94-Spring '95): Establishing a Collaborative Relationship and a Community of Co-Learners. During the second cycle we saw the beginnings of both a collaborative relationship and a community of co-learners

(Lieberman, 1988). With the establishment of a science emphasis sites, the attempt to move towards greater teacher empowerment at the preservice/inservice levels had been initiated. We learned that spreading the sites throughout districts was possible, but to achieve in-depth collaboration we would have to limit our work to certain sites. Our efforts had been primarily on the preservice component and the establishment of the idea of science emphasis sites. We now needed to focus on defining inservice teachers' needs. A collaborative framework had begun, but it was delicate. Efforts needed to focus on the collaborative development of a future agenda based on common needs.

Part 2: Recent Analysis of Sacred Stories

Cycle III (Fall '95 - Spring '96): The Search for Common Ground. At the end of cycle III we had made more significant gains, but recognized that our long term goal, to establish a true collaborative relationship, would take a long time. The greater gains at this point in the process were in part due to the significant amount of time invested in my work with the schools. This had lead to a partnership with a group of schools in the San Jose area, known as the River Alliance. Buy in at the school site level and support in-house was recognized as critical. It was also recognized that if we wanted to learn more about the process we would have to go with the sites that were the most promising, or what I would call "Hopeful Sites". This decision making was happening at the same time when I became aware that I needed to deal with the sacred stories of university practice (Connelly & Clandinin 1992). Therefore in my work with preservice/inservice teachers there was a need for sharing of "power", "voice", and "ownership" as we began to establish new ways of working in schools. Ellsworth (1992) notes the problems associated with the concept of "voice" in liberatory discourses in education. She also notes to argue for the pluralization of voices would imply a correction through addition which would lose sight of the contradictory and partial nature of all voices. Hence I began my search for common ground (Parsons, 1996).

Cycle IV (Fall '96 - Spring '97) The Continued Search for Routes to a Common Ground -- Dealing with the Sacred Stories. While an analysis of the accomplishments looked great on paper I knew the real struggle for change needs to begin. I really sensed that teacher education -- as we had known it -- was starting to be reconfigured. The traditional teacher education programs configured within universities were starting to unravel -- alternative routes to teacher preparation were starting to appear. While I felt excited about this potential I know the huge challenges ahead. Many of my colleagues would resist this process because of a need to preserve the sacred rites within the university. Also, I knew from my own work that a tremendous effort would be needed to develop relationships where little history of true collaboration

exists. The fact that we were encouraged to move ahead with the creation of university-school partnerships was also becoming a very political act. The history of politics and education suggested that care was needed. It was clear to me that teacher education needed to change, but how this happened was critical. I really sensed that educational history was being written. Some of us sense we were "on the verge" where there was no new model yet.

I described my research as being positioned within the latter two categories (emancipation and deconstruct) described by Lather. I believed such an action research agenda was timely given the critique of modernism that had been on-going in science education this last decade. This evolving critical/post-critical perspective was connected with my work as a feminist where I had engaged in an on-going autobiographical analysis of my practice since 1991 (Parsons, 1996).

My work suggested that if Colleges of Education do not start to value work in schools then the gap between the cultures would never be bridged. My work also suggested that just as we ask teachers to reflect of their work we also needed to reflect on our work. We needed to acknowledge the autobiographical connection. If the autobiographical connect was not made then fully collaborative university-school partnerships would not happen. It was important that Colleges of Education not continue to "mirror" ideologies embedded in the practices of a critically reflective institutions. This was critical to the survival of the education community within the university. I felt it was important to work within to change the institutional structure before it was changed from the outside. From what I had seen K-12 schools appeared to be responding to change faster than universities. This imbalance needed to be changed. Far too often university being the power/knowledge broker asked the schools to change without undergoing change itself. A true university school partnership would involve both partners fully participating in change over a long period of time.

Cycle V (Fall '97- Spring '98) The Beginnings of Critical Institutional Reflection[3]

Over the past ten years many school-university partnerships have sprung up across the country. Given the need to evaluate the effectiveness of such partnerships SJSU has just begun an evaluation of its school-university partnerships. My contribution to this research effort therefore has focused on the evaluation of an establishment of a science education partnership known as the River Alliance. The River Alliance is a partnership of five schools --

[3] For cycle 5 I have included a description of the data on which the storyline is being developed. For a more detailed description of the data in cycles 1-4 see Parsons(1996)

three elementary (Carson, Hacienda, Randol), one middle (John Muir), and one high (Pioneer) from the San José Unified School District that has joined with local high-technology companies and higher education to bring about educational reform. The result is a plan for a coordinated, K-12 curriculum that uses science as a foundation for promoting learning. The River Alliance school-university partnership is therefore focused on reform in teaching and learning at the school and university levels. By assuming a pluralistic theoretical perspective which has been influenced by post-critical theory, postmodernism/poststructuralism theory we have been involved in an examination of the success of our collaboration at developing a science education learning community among student teachers, classroom teachers, and university faculty (Bennis, & Biederman, 199?).

To evaluate the success of the school-university partnership SJSU needed answers about the impact our partnership on teaching, learning, learning to teach, and educational reform in science education. This lead to an initial focus on the following research questions:
a) How does our science education partnership impact student learning in science?
b) How does our science education partnership impact the continuum of professional development in science teaching (preservice, inservice and university faculty)?
c) How does our science education partnership impact whole school and district instructional improvement? and
d) How does our science education partnership impact university renewal?

To answer these questions since the Fall 1997 we have been actively engaged in pilot research efforts. The research has been primarily descriptive and includes data collected by qualitative methods: interviews, surveys, participant observation, observations of classrooms, and document review (preservice teachers and teacher educator journals, and action research papers). These research protocols have been informed by two research groups which I am a part of a SJSU cross site school-university partnership research group, and the SALISH (1997a, 1997b) science education research group.

Based on an analysis of patterns and themes to date in the pilot data the following is a summary of our results:

1. **Student Achievement**: Our partnership is presently involved in the establishment of new assessment plans for the evaluation of student learning where:

- Preservice teachers are engaged in inquiry (both inquiry based science and teaching as inquiry -- action research) in conjunction with their cooperating teachers.

Fall of 1997 16 K-8 student teachers (13 in phase 1 of student teaching and 3 in phase 2) were placed in River Alliance Schools. In addition EDTE 260 which serves as a capstone course for the credential program was taught site-based for the first time. The focus of the course was action research.

- Teachers within the River Alliance Schools are actively engaged in developing new assessment models based on national, state and district standards.

Teachers in River Alliance Schools have signed a MOU with Joint Venture: Silicon Valley centered around assessment of student learning. The district has also developed standards based on the national standards.

2. **Professional Development**: Emergence of new model(s) for professional development is evidenced by the establishment of:

- Real support for preservice teachers at their schools sites and from the university -- a community of learners has been established within the River Alliance Community of Schools.

Building upon an established school-university partnership SJSU and the River Alliance has an established preservice education committee which supports student teachers.

- a Professional Development Committee for River Alliance Schools to develop a professional development plan for River Alliance Schools.

Starting first with a preservice committee the River Alliance has come to look at a professional development plan for all stages of teacher education (preservice-veteran teachers).

- a Science and Literacy Inquiry Academy for the development of science teacher leaders district wide to be based within the River Alliance Schools, and

SJSU and SJUSD starting in 1998 will establish a Science and Literacy Inquiry Academy within the River Alliance Schools. We were successful in securing funding from Eisenhower to support the efforts for the next three years.

- an Institute for the development of Earth Science teacher leadership has also been funded by NSF for the next five years.

SJSU and SJUSD are also collaborating on the establishment of an Earth Science teacher leadership project within the River Alliance Schools.

3. **Whole School and District Change**: Across the River Alliance Schools there is documented evidence of beginning whole school change which has led to the establishment of:

- a Professional Development School at John Muir Middle School where science is a focus for teaching and learning across the curriculum,

- a Bay Area School Reform leadership site at Pioneer High School, and
- establishment of site-based preservice programs at the elementary schools.

4. **University Renewal**: Documented evidence of beginning university renewal such as:

- A move from traditional teacher preparation to the establishment of site-based credential programs.
- Plans to establish a site-based MA program in TE with an emphasis on Science and Technology.
- The establishment at SJSU an Office of School and University Partnership for Education Renewal (SUPER), K-12 School-University Advisory Board, and the Provost has appointed a committee to focus on reform in teacher education.

While an early analysis suggests that the groundwork has been laid for critical reflection on teacher education I have decided to focus on one theme --- University Renewal. This has lead to the following process for my continued action research:

1. Form the research team -- SJSU Research Team formed Fall '97
2. Define the problem -- What is the difference in pedagogical philosophy of university faculty involved in school and university partnership work for a short-time versus a long-time?
3. Collect the data -- Faculty have been interviewed using the TPPI (Teachers' Pedagogical Philosophy Interview)
4. Analyze the data -- Interviews have been transcribed and are being coded
5. Report the results -- The interviews will be analyzed for trends, or turning points?
6. Take action on a shared vision -- The results will be shared with the SJSU Partnership Research Team and the SALISH II Research Project

Discussion

The overall goal of my desire to facilitate an science education learning community has been to build a community of learners where university faculty and teachers would become co-learners in the process (Bollough, & Gitlin, 1995; Greenleaf, 1995). The evaluation of our partnership with the River Alliance Community is therefore not only working towards the improvement of practice, but the construction of a science education learning community. Based on an analysis of my efforts over this past five years (5 cycles) the following patterns have emerged:

1. Cycle I (Spring '93-Fall '94) Initiating Collaborative Relationship
2. Cycle II (Fall '94-Spring '95) Establishing Collaborative Relationship & Community of Co-Learners,
3. Cycle III (Fall '95-Spring '96) The Search for Routes to a Common Ground for the Building of a Community of Co-Learners,
4. Cycle IV (Fall '96-Spring '97) The Continued Search for Routes to a Common Ground: Dealing with the Sacred Stories
5. Cycle V (Fall '97-Spring '98) The Beginnings of Critical Institutional Reflection

During cycles 1-2 the focus was on changing, or enticing "others" to become part of the learning community. Cycle 3 can viewed as a turning point where I recognized the serious need for institutional self-reflection. Cycles 4-5 describe my attempts to get the institution to engage in self-reflection. While the institution has now became part of the process this year it remains to be seen if serious institutional reflection occurs.

Without overcoming the limitations of a non-critically reflective institution a fully collaborative school-university partnership will not happen. It is important that SJSU not continue to "mirror" ideologies embedded in the practices of critically unreflective institutions. Often K-12 schools appear to be responding to change faster than universities. This imbalance needs to be changed. Far too often university being the power/knowledge broker asks the schools to change without undergoing change itself. A true school-university collaboration will involve both partners fully participating in change over time.

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